Far field and near field emission spectrum measurements of an X-band maritime navigation surface search radar

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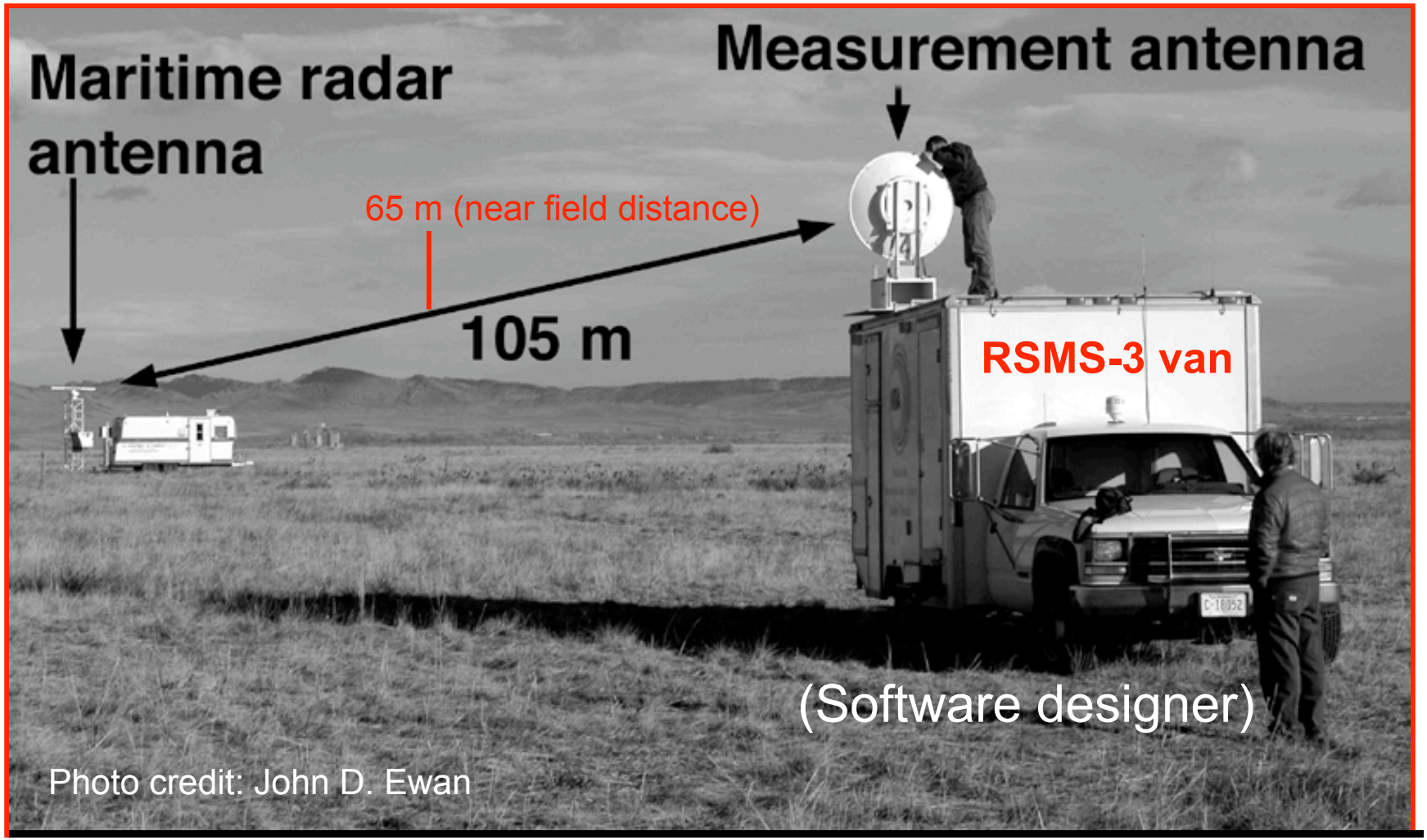
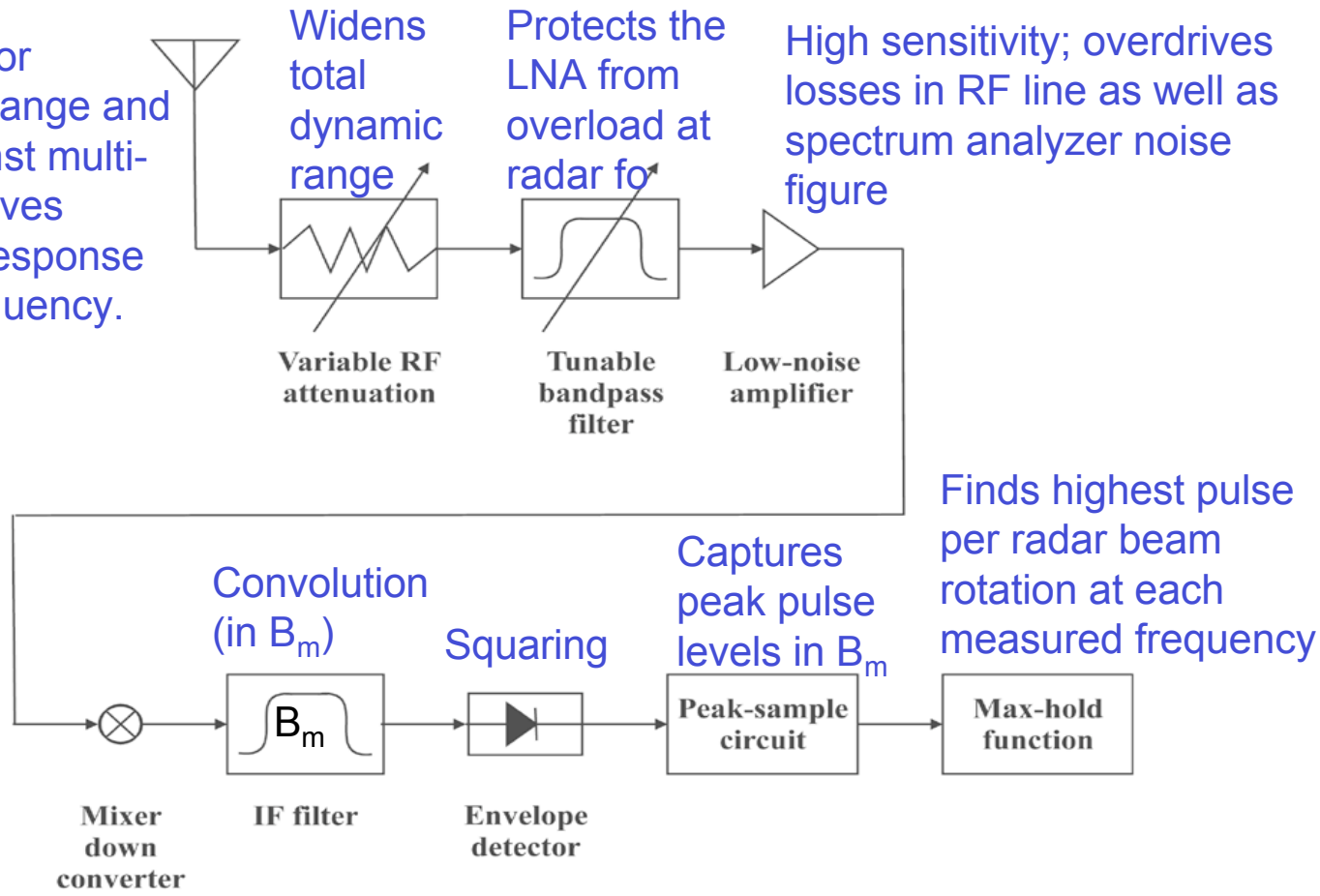
Measurement



Measurement system functional block diagram

Parabolic antenna for improved dynamic range and discrimination against multi-path effects. Also gives constant-aperture response as a function of frequency.



Stepped Mode Measurements

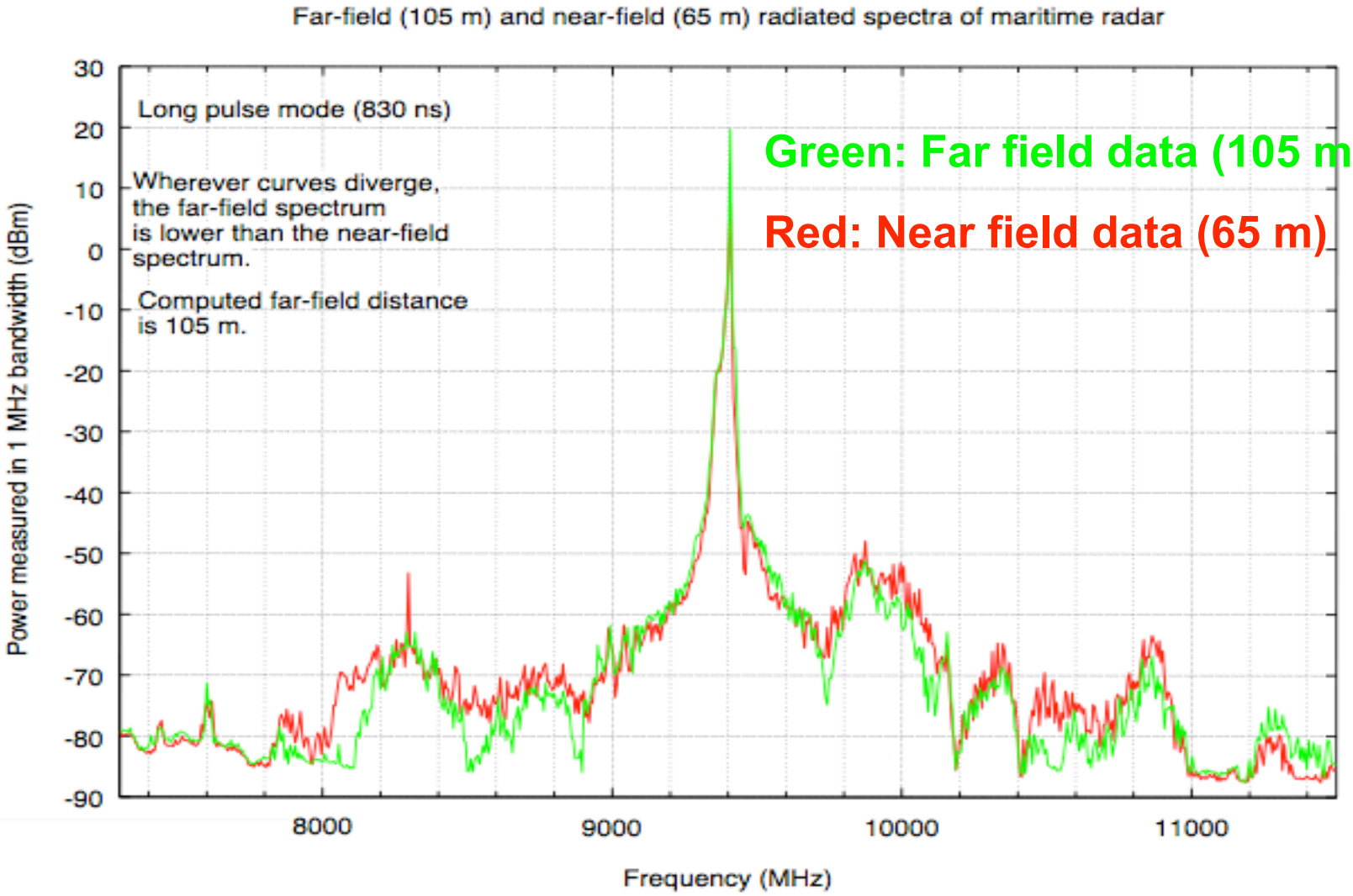
- Basic strategy is to *step* (in a series of zero-hertz time slices) across a frequency range. Each time slice is a little longer than the radar beam rotation interval (about 2.6 seconds for this radar).

- Sophisticated mode requiring computer control of spectrum analyzer

- Dynamic range of about 60 dB (spectrum analyzer) plus 70 dB (front-end attenuator) for a total of 130 dB maximum dynamic range

- Critical for measuring radar emissions, plus miscellaneous applications to other transmitters

Results of near field/far field measurements



Summary of Results

Far field and near field spectrum measurements of a maritime radar yielded similar results. Observed differences were mainly in the depth of nulls in the spectra.

Preliminary Conclusions

* The result of this measurement suggests that it may be possible to measure radar emission spectra in the near field with some accuracy.

* However, the data presented here are for a single radar unit; more study is probably required to understand the accuracy and validity of near-field spectra.

* Additional measurements and theoretical examination would be desirable.